

April 4, 1889.

Professor G. G. STOKES, D.C.L., President, in the Chair.

The Presents received were laid on the table, and thanks ordered for them.

The Right Hon. Baron Henry de Worms, whose certificate had been suspended as required by the Statutes, was balloted for and elected a Fellow of the Society.

The following Papers were read:—

- I. "On the Magnetic Inclination, Force, and Declination in the Caribbee Islands, West Indies." By T. E. THORPE, Ph.D., F.R.S. Received March 16, 1889.

The following determinations of the magnetic elements among the Caribbees or Windward Islands were made in August, 1886, on the occasion of the Eclipse Expedition of that year to Grenada.

The instruments employed were magnetometer Elliott No. 61, and Dip Circle Dover 83, belonging to the Science and Art Department.

The method of observation was similar to that adopted in the Magnetic Survey of the British Isles for epoch January 1st, 1886, for which these instruments were also employed.

I. ST. GEORGE, GRENADA.

Station: Near the watering-place and close to the edge of the southern shore of the harbour.

Lat. $12^{\circ} 2' 52''$ N. Long. $61^{\circ} 44' 35''$ W.

Inclination.

	Needle I.	Needle II.
Aug. 13, 1886 (2.45 to 4.10 P.M.) ..	$40^{\circ} 53' 8''$	$40^{\circ} 55' 6''$

Horizontal Force.

(a) Deflections.

	Temp.	Observed deflections.
Aug. 13, 1886.....	29.1°	$14^{\circ} 7' 48.5''$ $5^{\circ} 53' 41.2''$

(b) Vibrations.

	Temp.	Time of one vibration.		
Aug. 13, 1886....	32.6°	3.0540 secs.	} Mean = 3.0538 secs.	
		3.0537 „		
$m = 0.00103109.$		$H = 3.1093.$		

Declination.

(a) Geographical Meridian.

	Local appt. time of passage of ☉ centre.			Correct. for mirror.	Geographical meridian.
	hr. m. s.	☉ alt.			
Aug. 13, 1886..	4 33 29	23° 40'	—0.1		252° 14'

(b) Magnetic Meridian.

	L.M.T. hr. m.		Torsion.		Magnetic meridian.
Aug. 13, 1886....	4 14	—0.4'			252° 55.9'

II. HOG ISLAND, BAY OF CLARKES COURT.

Station: Site of Eclipse Station; on a creek on the eastern side of the Island.

Lat. 12° 0' 40'' N. Long. 61° 43' 45'' W.

Inclination.

	Needle I.	Needle II.
Aug. 25, 1886 (10.30 to 12.10)....	41° 14'	41° 14.2'

Horizontal Force.

(a) Deflections.

	Temp.	Observed deflections.
Aug. 22, 1886 (11.5 to 11.31)..	29.7°	14° 8' 38.7'' 5° 54' 13.7''

(b) Vibrations.

	Temp.	Time of one vibration.	
Aug. 22, 1886	28.8°	3.0573 secs.	} mean = 3.0577 secs.
		3.0582 „	
$m = 0.00102963.$		$H = 3.1000.$	

Declination.

(a) Geographical Meridian.

	Local appt. time of passage of ☉ centre. hr. m. s.	☉ alt.	Correct. for mirror.	Geographical meridian.
Aug. 22, 1886..	2 47 27	49° 4'0'	-0.5	19° 58.9'.

(b) Magnetic Meridian.

	L.M.T. hr. m.	Torsion.	Magnetic meridian.
Aug. 22, 1886....	10 9	+0.1'	20° 50.3'

As the island of Grenada is highly volcanic in parts, it is not improbable that the observations may be affected to some extent by local disturbance.

III. ISLAND OF CARRIACOU.

Station: On the shore of the bay on the southern end of the island.
Lat. 12° 27' N. Long. 61° 29' W.

Horizontal Force.

Vibrations.

	Temp.	Time of one vibration.	
Aug. 23, 1886..	33.7°	3.0723 secs. }	mean = 3.0729 secs.
(4 hr. 38 m.)		3.0735 „ }	
m	= [0.00102963].		$H = 3.0771.$

Declination.

(a) Geographical Meridian.

	Local appt. time of passage of ☉ centre. hr. m. s.	☉ alt.	Correct. for mirror.	Geographical meridian.
Aug. 23, 1886..	3 53 49	32° 54'	+0.1	148° 52.2'

(b) Magnetic Meridian.

	L.M.T. hr. m.	Torsion.	Magnetic meridian.
Aug. 23, 1886....	4 27	0.0'	149° 8.5'

The observations at Carriacou were much interfered with by rain, and no determinations of dip were possible. The moment of the magnet has been assumed to be that determined at Hog Island on the previous day.

The results may be thus summarised :—

Station : Aug., 1886.	Inclination.	Force.		Declination.
		Horizontal.	Total.	
St. George, Grenada.....	40° 54'·7	3·1093	4·1144	0° 41'·5 E.
Hog Island, Grenada.....	41 14·1	3·1000	4·1223	0 51 5 E.
Island of Carriacou.....	—	3·0771	—	0 16 3 E.

II. “Experiments on the Resistance of Electrolytic Cells.” By
Capt. H. R. SANKEY, R.E. Communicated by W. H. PREECE,
F.R.S. Received March 21, 1889.

(Abstract.)

It was observed during the course of some experiments on the electrolytic deposition of copper that the resistance of the electrolytic cells employed was greater the lower the current density, and the experiments described in this paper were undertaken to inquire more definitely into the matter.

Many physicists have already observed the same effect, and have ascribed it to a resistance at the junctions of the electrodes with the electrolyte, and called it “transfer” resistance.

In these experiments a prismatic electrolytic cell of triangular cross-section was employed, and the area of the electrodes was equal to that of the cross-section of the liquid. The electrodes experimented with were electrotypes copper, lead, zinc, and platinum, and the electrolytes, solutions of CuSO_4 of various sp. gr., neutral and acidulated, of ZnSO_4 , MgSO_4 , NaCl , Na_2CO_3 , dilute H_2SO_4 , &c. The electrodes were placed at different distances apart, but in general had an area of 50 square cm.

All the measurements were made by noting the swing of a Thomson’s reflecting galvanometer, used as a potentiometer, and standardised before each trial by means of a Clark’s cell.

The current was measured by observing the potential difference across a known resistance.

The P.D. of the cell was proportional to the swing of the spot of light.

The counter E.M.F. was obtained by taking the swing on breaking the circuit, the galvanometer being connected across the terminals of the cell; but this swing is *not* proportional to the C.E.M.F. existing in the cell whilst the circuit is completed. Readings were, there-